SPIRAL WHEEL PUMP TESTING IN RIVER

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ABSTRACT:

In today's world Energy and its optimum use is increasing due to depletion in resources, Massive research are done on Sustainable energy. Spiral Wheel Pump is a pump, which works on conservation of energy and use renewable source of energy that is river flow kinetic energy to pump water to fields. Agriculture plays a crucial role in daily life as it provides food. Agriculture is also the backbone of our economic system; also, agriculture not only provides food and raw material but also employment opportunities to a very large proportion of population. Focus of our topic is to provide our farmers better opportunity and convenient way to pump water from river it gets difficult to operate water pumps and need electricity. After we made our spiral wheel pump it was very important to check how feasible our model is, as very less experimental data regarding this pump is available hence our work will provide necessary data to other professionals who are working on this machine/mechanism and also motivate young engineers to work on agriculture technology.

KEY WORDS:

Spiral tube, tidal waves, discharge, pressure, climatic conditions.

INTRODUCTION:

Around the globe, pump is used for many purposes. In this testing of pump we are focusing on how well pump used for agricultural purposes. In rural areas farmers are facing problems of scarcity of electricity. The physical locations of some villages are such that it becomes very difficult to supply electricity to those areas or even if electricity is facilitated, the climatic conditions or rather the change in climatic conditions are such that it is not feasible to provide the electricity by conventional means. However, we can't change the environmental conditions but we can use the non-conventional i.e. the renewable means to pump. The generator is connected with the pump through various mechanical linkages. Pump also saves cost of electric bill and that will benefit as they use renewable source.

LITERATURE REVIEW:

Basic idea of spiral wheel pump came from "Spiral fluted wheel for a water pump". In this project a spiral fluted wheel has a top plate, a bottom plate and multiple spiral impellers. The spiral impellers are sandwiched between the top plate and the bottom plate to combine the top plate and the bottom plate together. Each spiral impeller has two wedges to complementary engage with another wedge of an adjacent spiral impeller. At least one male engaging element is formed on one wedge of each spiral impeller, and a female engaging portion is defined in the other wedge to engage with each respective male engaging element on the adjacent spiral impeller. Accordingly, the spiral fluted wheel can be combined rapidly and precisely. Further the generation survey has revealed as follows, as the name suggests it generates electricity. Michael Faraday's discovery of electromagnetic induction demonstrated a way to construct a simple generator, but there was little need for such a device until commercial technologies that used electricity, such as lights, appeared. The earliest commercial uses of electricity, such as telegraphy, arc lighting systems, and metal electroplating used batteries as their power source. This was a very expensive way of generating electricity.

PROJECT SPECIFICATIONS:

Overall length = 5 m.
Overall height = 84 inch
Overall width (diameter) = 78 inch
Overall weight =45 kg

Square hollow rod length = 3 feet
Square hollow rod width = 1 inch
Square hollow rod weight quantity 8 = 7.27 kg

Spiral pipe (suction pipe) length = 20 m

Spiral pipe diameter = 1.5 inch
Spiral pipe weight = 6.7 kg

Nuts and bolts weight = 3.3 kg

Pedestal bearing diameter = 2 inch

Hollow shaft length = 4 m
Hollow shaft diameter = 2 inch
Hollow shaft weight = 5 kg

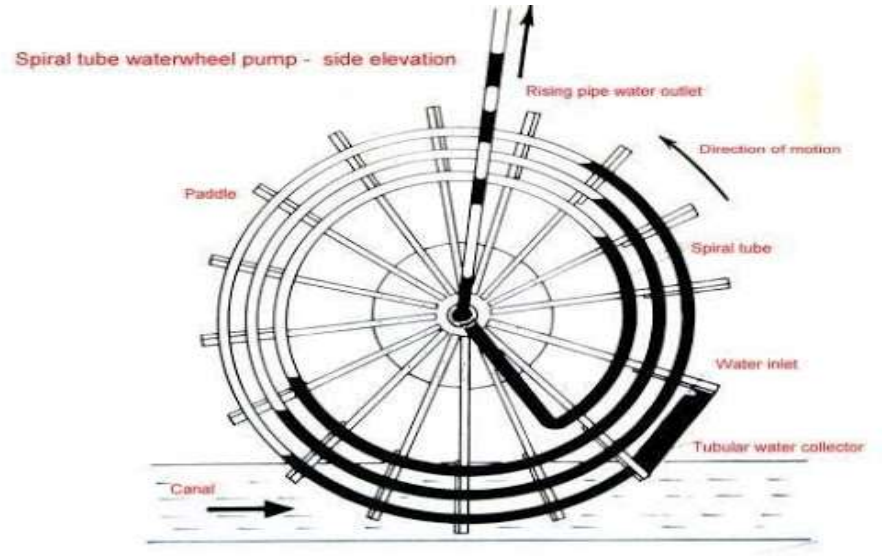
Square Vanes size = 12 inch * 12 inch
Vanes weight Quantity 8= 9.5 kg

Swivel joint weight = 2 kg
Joint extension pipe length = 4 m
Joint extension pipe diameter = 1.5 inch

Adjustable stand max. height = 3.5 feet
Adjustable stand min. height = 4.5 feet

SR.NO.	COMPONENTS	QUANTITY
1	Pedestal bearing	2
2	Hollow shaft welded with 2 plates	1
3	Swivel joint	1
4	Adjustable stand	1
5	Spiral wheel	1
6	Reducer	1
7	Vanes (galvanized metal sheets)	8
8	Square hollow section	8
9	Hose	1
10	Bearing clamp	2
11	Generator (D.C. motor)	1
12	Pulley drive	1

CONSTRUCTIONAL DETAILS:



SPIRAL WHEEL PUMP

This project is made by joining Spiral Wheel Pump and Electricity Generator. When considering the building of a spiral pump, we assumed that the pressure produced would be directly related to the wheel diameter and the number of coils. After some deliberation, a six-foot wheel was built. It was felt that a smaller wheel with proportionately smaller coils might not provide high enough pressures for a realistic evaluation of working sized machine. The overall height of wheel will be approximate 6.5 feet. The spiral pipe end at the centre is connected to the hollow metal shaft (house) at the centre of wheel. The hollow extension pipe is then with the hollow metal shaft at the centre with the help of the swivel joint. The purpose of the swivel joint is to restrict the rotation of the extension pipe as the internal part of joint is stationary and the outer part is rotating.

OPERATION:

As the tidal waves flow, the tidal waves will strike the runner. This striking motion will cause the spiral pump to rotate. As soon as the rotation starts, the inlet end of the hollow spiral pipe takes into the flow. The flow then reaches at the top of the spiral and flows down to the lower spiral level due to the gravity. The flow in the similar manner travels throughout the spiral and develops a high pressure due to its height, density and the gravitational force. The flow then ejaculates through the outlet pipe. This flow coming out of the outlet pipe is having high discharge pressure, which will be utilised for the flow transfer to the various agricultural fields.

PROCEDURE:

1) Pace Spiral Wheel Pump in river current.
2) Make sure position of pump is correct so that water impacting vanes efficiently.
3) Have proper base so that pump is standing firm.
4) Place appropriate device at outlet so that can measure discharge, we had placed a container at outlet and noted the time by which bucket is full.
5) Note value of discharge.

SPIRAL WHEEL PUMP TESTING IN BHATSA RIVER:

CALCULATION:

To find outlet velocity

V = Outlet Velocity,

d = diameter of outlet,

A = area of cross-section of outlet= $\pi d^2/4$
Q = Discharge at Outlet (from experiment performed in river)

The value of density (ρ) of water = 1000 kg/m³

We know,

Flow rate Q = 21 l/min = $3.5x10^{-4}$ m³/s

d = diameter of outlet pipe = 0.05m

Area of cross-section A = $(\pi/4) *d^2 = (\pi/4) (0.05)^2 = 1.96*10^{-3}$ m²

Q = A x V

$3.5*10^{-4} = 1.96*10^{-3}V$

V = 0.178m/s

RESULTS:

Test on spiral wheel pump was performed in the river. Discharge of water was found 21 l/min after testing in the Bhatsa river.

CONCLUSION:

Testing of spiral pump is clarified that Spiral wheel pump can provide sufficient discharge to fulfil needs of farmers to pump water to their respective fields.

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